

Effects of Democratic and Authoritative Discourse Patterns on Students' Achievement in Biology in MUBI Educational Zone Of Adamawa State

Ugwuadu, O.R

Department Of Science Education Modibbo Adama University Of Technology Yola, Adamawa State

Abstract: *This study investigated the effects of the democratic and authoritative discourse patterns on students' achievement in biology in Mubi educational zone of Adamawa State. The design of the study was quasi-experimental of non equivalent comparative group design. Two research questions and one null hypothesis tested at 0.05 level of significance guided the study. The sample of the study was 170 SSII biology students sampled from two co-educational schools by random sampling technique by ballot system. One intact class of 90 students was randomly selected from five classes by ballot in one school and another one intact class of 80 students was also sampled from four classes in the other school. Ninety-two students were males while seventy-eight were females in the sample. The democratic discourse pattern was used in one school while the authoritative discourse pattern was used in the other, all chosen by ballot. The instrument for data collection was a Biology Achievement Test which was both face and content validated with a reliability coefficient of 0.72 established with Kuder-Richardson formula 20. Data were analyzed using mean, standard deviation and Z-test. Results reveal that there is significant difference in the mean achievement scores of students taught with democratic discourse pattern and those taught with authoritative discourse pattern in favour of those taught with democratic discourse pattern. Male and female students taught using the democratic discourse pattern performed better than male and female students taught with authoritative discourse pattern judging with their mean scores. The democratic discourse pattern enhanced students' achievement more than the authoritative discourse pattern. It was recommended among others that teachers should use the democratic discourse pattern in teaching biology and reduce the use of authoritative discourse pattern.*

I. Introduction

Discourse patterns are verbal communication patterns used to pass information to people. The democratic and authoritative discourse patterns are defined as verbal expression, conversation, speech or talk patterns (Sadler, 2006; Viiri & Saari, 2006). In teaching-learning process, teachers and students use the democratic and authoritative discourse patterns in classroom interactions. The democratic discourse pattern is also called the dialogic discourse pattern (Viiri & Saari, 2006; Ugwuadu, 2011) because it involves dialogue and sharing of ideas. In a biology lesson for instance, the teacher using the democratic discourse pattern in teaching opens up a discourse on a biology problem for students to verbally and freely contribute ideas that could reveal their knowledge and understanding of the problem. There is no restriction to the direction of the discourse. During a lesson, the teacher accepts views and seeks the opinions of students in the teaching-learning process. The teacher also gives reinforcement like praises and encouragement to meaningful contributions from students (Viiri & Saari, 2006). Students are also encouraged to ask questions during the process of teaching.

With these characteristics, the democratic discourse pattern encourages active participation of students in a lesson through exchange of ideas with the teacher (Ugwuadu, 2011). In implementing the pattern in the classroom, the teacher organizes the students into groups of four or five students per group, each group is assigned a student-leader who coordinates the exercise while the teacher interacts with each group to assess the quality of their contributions and gives feedback. The democratic discourse pattern is associated with the discussion method of teaching because both of them share similar characteristics (Ugwuadu, 2011).

The democratic discourse pattern contrasts sharply with the authoritative discourse pattern because the authoritative discourse pattern is autocratic in that authority is centralized (NTI, 2000; Viiri & Saari, 2006). The authoritative discourse pattern affords little or no interaction between the teacher and the students during classroom activities. The discourse pattern is related to lecture method of teaching because the two strategies share similar characteristics of being teacher-dominated. In addition, students are inhibited from sharing ideas and opinions with the teacher instead, they are required to comply with orders from the teacher without questioning (Ugwuadu, 2011). The main pre-occupation of the teacher in using the authoritative discourse pattern is verbal presentation of facts and principles to students while students remain passive (Padron & Waxman, 1999).

Udeani (1992) found out that teacher-dominated classrooms do not offer any higher premium to Integrated Science students as do the more democratic and participatory interaction patterns. Adaji (2006) found out that the total mean achievement scores of pupils taught using verbal reinforcement strategy was higher than that of control groups taught with lecture method; teaching with verbal reinforcement strategy encourages pupils' learning; all the experimental groups male and female performed better than the control groups. Ugwuadu (2011) found out that there is no significant difference in the compared mean achievement scores of male and female students taught biology topics using the democratic discourse pattern; the democratic discourse pattern enhanced students' achievement in biology.

Discourse pattern be it democratic or authoritative is not teacher's methodology of teaching rather it is used to implement teaching methodology by being talk or communication patterns. In other words, discourse patterns and teaching methodology are used simultaneously during classroom interaction and not in isolation. Being a speech or verbal communication patterns, the democratic and authoritative discourse patterns may be of benefit in improving the persistent poor achievement of students in biology (science life) and in understanding of difficult topics since different discourse patterns were found useful in classroom interactions (Viiri & Saari, 2006). Ugwuadu & Obi (2009) isolated food web, community and ecosystem topics in ecology as difficult topics to students. According to Nwagbo, 2001; Okoli, 2006, students' performance in Senior School Certificate Examination (SSCE) is persistently poor while Ajewole (1991) found out that students' performance in SSCE biology practical is also poor. Ugwuadu, (2009) found out that the status of biology practical in Adamawa State is poor. The WAEC Chief Examiners (2002 & 2004) reported that students' performance in biology practical was poor as well.

The researcher wanted to determine whether students' achievement would improve if the democratic and authoritative discourse patterns are used as main effects in this study. The researcher also wanted to determine whether the performance of male and female students would improve by using the two patterns. The problem of this study is: what would be the effects of the democratic and authoritative discourse patterns on students' achievement in biology? Would the use of the two discourse patterns improve the male and female students' achievement in the biology topics used for the study? The biology topics used for the study are food test and ecological succession which students perceive as difficult (Ugwuadu, 2011 & 2012).

Purpose of the Study

The general purpose of this paper was to investigate the effects of the democratic and authoritative discourse patterns on students' achievement in biology. Specifically, the study determined the effects of:

1. the democratic and authoritative discourse patterns on students' achievement in biology.
2. the democratic and authoritative discourse patterns on male and female students' achievement in biology.

Research Questions

The following research questions were posed to guide the study:

1. What is the effect of the democratic and authoritative discourse patterns on students' achievement in biology?
2. What is the effect of the democratic and authoritative discourse patterns on male and female students' achievement in biology?

Hypothesis

The following null hypothesis was formulated and tested at 0.05 level of significance to guide the study

H₀₁: There is no significant difference in the mean achievement scores of students taught the biology topics using the democratic and authoritative discourse patterns.

II. Research Method

The research design adopted for this study was quasi-experimental of pre-test, post-test non equivalent comparative group design. This design was adopted because subjects were not randomly assigned to groups instead, intact classes were randomly assigned to experimental groups. This study was carried out in co-educational schools in Mubi educational zone of Adamawa State, Nigeria.

The population of the study consisted of all senior secondary two (SSII) biology students numbering 5,046 in 32 co-educational schools. Co-educational schools were used because the researcher wanted to determine whether the two discourse patterns could have any effect on achievement of male and female students in the same class and school in the biology topics used for the study. The sample of the study was made up of 170 SSII biology students (92 males and 78 females; 90 students and 80 students from the schools) selected using random sampling technique by ballot system. One intact class of SSII was randomly selected from five

classes in school I and another one intact class was selected from school II with four classes as shown in Table 1.

Table 1: Sample of Students in the intact Classes used for the Study

Schools	Male	Female	Total no. of students	Remarks
School I	50	40	90	Experimental group
School II	42	38	80	Experimental group
Total	92	78	170	

Data in Table I shows that students in schools I and II were all used as experimental groups. School I is made up of 50 males and 40 females in one intact class and 42 males and 38 females in school II all randomly selected. Using ballot system, the democratic discourse pattern was taught in school I while the authoritative discourse pattern was used in school II. In the two schools male students were 92 while females were 78.

The main instrument used for data collection was a Biology Achievement Test (BAT) which was constructed by the researcher. The BAT was a multiple-choice objective test with options lettered A-D consisting of 50 items on the biology topics used for the study. The items measured the six objectives in the cognitive domain of Bloom's taxonomy of educational objectives spread across the table of specification used in constructing the test. The draft BAT was given to two experts each, in Science Education (Biology) and Educational Measurement and Evaluation for face and content validation at Modibbo Adama University of Technology, Yola. The experts were requested to assess the items in terms of clarity of expression, suitability of items, accuracy of answers (face validation) and content coverage of the BAT against the syllabus prescriptions with the table of specification used (content validation). The validators were also requested to make amendments where necessary. After the validation 44 items were returned as useful items while six items were dropped because some items were ambiguous while some were out of syllabus content.

The 44 useful items were trial-tested on 30 male and female students at a school different from the ones used for the study but the schools were of similar status. The data collected from trial-testing were used for item analysis (item difficulty and item discrimination indices) which were calculated using 27% cut-off for each item for upper and lower class of testees that got the items correct (Ugodunwa & Ugwuanyi, 1999). The selection of the items was based on 0.29 and 0.80 for difficulty index while +0.23 and above was used to determine the discrimination index. After the analyses, 38 items were selected while six items were rejected because the items did not meet the cut-off points stated. The reliability of the test was determined with Kuder-Richardson formula 20 (K-R 20) method which was used to estimate the internal reliability coefficient that gave 0.72. The result of the trial testing with 38 selected items was used to estimate the reliability coefficient using the formula.

Treatment procedure

The discussion method was used along with the democratic discourse pattern for school I while the lecture method was used with the authoritative discourse pattern in school II. The researcher used the associated method of each of the two discourse patterns in order to ease comparison. The researcher trained two research assistants who were regular biology teachers in each school to help carry out the experiment. The two different discourse patterns were used in different schools in order to avoid contamination of treatment if all of them were used in one school because two different methods and two different discourse patterns were involved in the study. Some students may be curious to know what was happening in the other class if one school was used thereby contaminating the experiment due to mix-up of experience.

On the first day of the experiment, BAT was administered as pre-test on each of the groups. Later the two groups were taught the biology topics using their respective discourse patterns and teaching methods in their respective schools. The experiment lasted for four weeks and the last period of the fourth week was used for administering post-test. The researcher co-ordinated the exercise using a timetable prepared for the study. The lesson plan used for the study was prepared by the researcher in order to ensure uniformity and acceptable standard.

Method of Data Analysis

Mean and standard deviation were used to answer the research questions while Z-test was used to test the hypothesis. Each correct answer was awarded one mark making a total of 38 marks.

III. Results

The results of the study were analyzed using the data obtained from the achievement test and presented in tables according to research questions and hypothesis.

Research Question one

What is the effect of the democratic and authoritative discourse patterns on students' achievement in biology?

Table 2: Pre-test Results from the two Co-educational Schools

Groups	n	x	x difference	SD
Democratic Discourse	90	15.6	0.2	0.82
Authoritative Discourse	80	15.8		
		0.74		

Data in Table 2 shows the pre-test results of the students taught using the democratic discourse pattern and those taught using the authoritative discourse pattern. The result reveals a small mean difference of 0.2 indicating that the students used for the study are of equal academic background.

Table 3: Post-Test Results from the two Co-educational Schools

Groups	n	x	SD
Democratic discourse	90	34.2	4.82
Authoritative discourse	80	19.6	3.96

Data in Table 3 reveals the post-test results. It is observed that the students taught with the democratic discourse obtained a mean score of 34.2 while the authoritative discourse pattern group has 19.6 mean score. It implies that the democratic discourse pattern group performed better than the authoritative discourse pattern group. This performance of the democratic discourse pattern group could be as a result of treatment effect on the group. The result in table 3 answers research question one.

Research Question two

What is the effect of the democratic and authoritative discourse patterns on male and female students' achievement in biology?

When the results presented in Table 3 was analyzed, the breakdown of the mean scores (34.2) and (19.6) obtained according to sexes were as follows (Table 4).

Table 4: Breakdown of Mean Score Obtained after Post Test according to Sexes

	Total
Mean score of male students taught with democratic discourse pattern = 19.2	34.2
Mean score of female students taught with democratic discourse pattern = 15.0	
Mean score of male students taught with authoritative discourse pattern = 11.0	19.6
Mean score of female students taught with authoritative discourse pattern = 8.6	

Data in Table 4 shows that male and female students taught with democratic discourse pattern performed better than male and female students taught with authoritative discourse pattern. The results according to sexes as in Table 4 answer research question two.

H₀₁: There is no significant difference in the mean achievement scores of students taught the biology topics using the democratic and authoritative discourse patterns.

Table 5: Z-test Analysis of grand mean scores of students taught using the democratic and authoritative discourse patterns.

Groups	n	\bar{x}	SD	Df	Z-cal	Z-crit.	Decision
Democratic discourse	90	34.2	4.82				
				168	21.50	1.960	*sig
Authoritative discourse	80	19.60	3.96				

Z-cal = Z-calculated; Z-crit. = Z-critical; *sig = significant at 0.05 level of significance.

Table five indicates that Z-calculated is greater than Z-critical at 0.05 level of significance, H₀₁ is rejected.

Findings from the Study

The following findings resulted from the study

1. The students used for the study are of equal academic background from their pre-test results which showed small difference (0.2).
2. Students taught using the democratic discourse pattern performed significantly better than the students taught using the authoritative discourse pattern after post-test.
3. Male democratic discourse pattern group performed better than the female authoritative discourse pattern group.
4. Female democratic discourse pattern group performed better than the male authoritative discourse pattern group.

IV. Discussion of the Findings

The democratic discourse pattern enhanced students' achievement in biology more than the authoritative discourse pattern. Some of the reasons could be that the democratic discourse pattern is participatory in nature and encourages teacher-student interaction while the authoritative discourse pattern is teacher-dominated and affords little or no interaction between the teacher and the students (Viiri & Saari, 2006). This result is also in line with that of Udeani (1992) that teacher-dominated classrooms do not offer any higher premium to integrated science students as do the more democratic and participatory interaction patterns.

The democratic discourse pattern group performing better than the authoritative discourse pattern group could also be because encouragement was given to the group by the teacher (Viiri & Saari, 2006). The democratic discourse pattern is characterized by the use of reinforcement in teaching while authoritative discourse pattern lacks it. This result agrees with Adaji (2006) that the total mean achievement scores of pupils taught using verbal reinforcement strategy which is democratic was higher than that of the group taught using the lecture method; teaching with verbal reinforcement which is an encouragement enhanced pupils' learning. Apart from the use of reinforcement the democratic discourse pattern encourages sharing of ideas, asking questions, teacher seeking students' opinions (Viiri & Saari, 2006; Ugwuadu, 2011). These characteristics of the democratic discourse pattern helped to increase the chances of the group in performing better than their counterparts.

From the results of this study also, males in democratic discourse pattern group performed better than the females in authoritative discourse pattern group while the females in democratic discourse pattern group performed better than the males in authoritative discourse pattern group by their total mean scores (Table 4). This finding is related to the findings of Adaji (2006) that all the experimental groups male and female performed better than the control groups male and female. The result of this study is also in line with that of Ugwuadu (2011) that there is no significant difference in the mean achievement scores of male and female students taught biology contents using the democratic discourse pattern which implies that the two sexes taught with democratic discourse pattern performed equally after post-test. The impressive achievement of students (male and female) could be due to treatment effect which made them perform better than the authoritative discourse pattern group that were devoid of much teacher-student interaction and encouragement.

V. Conclusion

The following conclusions resulted from the study:

1. The democratic discourse pattern enhanced teaching and learning more than the authoritative discourse pattern in biology.
2. There is significant difference in the mean achievement scores of students taught biology contents using democratic discourse pattern and those taught using authoritative discourse in favour of democratic discourse pattern.
3. Male and female democratic discourse pattern group performed better than male and female authoritative discourse pattern group.
4. The persistent poor achievement of students in biology could be due to teachers' inability to use much of democratic discourse pattern in biology teaching.

VI. Recommendation

The following recommendations resulted from the study:

1. Teachers should use the democratic discourse pattern in biology teaching because the democratic discourse pattern enhanced students' achievement in biology.
2. Teachers should reduce the use of authoritative discourse pattern in biology teaching.
3. Seminars and workshops should be organized for teachers to enable them acquire the skills of democratic discourse pattern for teaching biology.

References

- [1]. Adaji, T.O.(2006) A gender analysis of effects of verbal reinforcement strategy on Academic achievement of poor achieving pupils in Mathematics in the primary schools: A case study of Olamaboro Local Government Area of Kogi State, *Journal of Research in Education*, 3(3): 75-81.
- [2]. Ajewole, G.A (1991) Innovation in Biology: Adopting an Innovation Strategy for Improving the Teaching and Learning of Biology, *Proceedings of Ajumogobai Memorial Conference of STAN* (A.O. Olarewaju ed), UNESCO Assisted Publication: 135-139
- [3]. National Teachers Institute (NTI) (2000), *NCE/DLS Course Book on Education, Cycle 1 Modules 6-8*, Kaduna: National Teachers' Institute.
- [4]. Nwagbo, C. (2001) "The relative efficacy of guided inquiry and expository Methods on the achievement in Biology of students of different levels of scientific literacy", *Journal of the Science Teachers' Association of Nigeria*, 36 (1&2): 43-51.
- [5]. Okoli, J. N. (2006) Effect of investigative laboratory approach and expository Methods on acquisition of science process skills by Biology students of different levels of scientific literacy, *Journal of the Science Teachers' Association of Nigeria*, 41(1 &2): 79-88.
- [6]. Padron & Waxman (1999) Teaching and learning Risks associated with limited cognitive mastery in Science and Mathematics for Limited English Proficient students, Paper presented at a conference at the University of Houston.
- [7]. Sadler, T.D (2006) Promoting discourse and argumentation in science, *Teacher Education, Journal of Science Teacher Education*, 17: 323-346.
- [8]. Udeani, U.N. (1992). Learning outcomes in integrated science as related to Teacher and Student characteristics and classroom interaction pattern Unpublished Ph.D Thesis, University of Nigeria, Nsukka.
- [9]. Ugodulunwa, CA. & Ugwuanyi, C.L. (1999) *Understanding Educational Evaluation*, Jos: Fab Anieh (Nig.) Ltd.
- [10]. Ugwuadu, O.R. (2009). Status of practical biology in secondary schools in Yola North L.G.A of Adamawa State. *Nigerian Journal of Research and Production*, 14(2):173-187
- [11]. Ugwuadu, O.R (2011) Effects of Discourse Patterns on Students' Achievement and Interest in Biology. Unpublished Ph.D Thesis, University of Nigeria, Nsukka
- [12]. Ugwuadu, O.R. & Obi, C.I. (2009). Isolating Topics of High Perceived Difficulty in Secondary School Biology in Adamawa State. *Journal of Educational Studies*, 14(2):172-187.
- [13]. Ugwuadu, O.R and Abdullahi, S. (2012) Effect of Cooperative Learning Strategy on Biology Students' Academic Achievement in Yola Educational Zone of Adamawa State. *Knowledge Review: a Multidisciplinary Journal*. 24 (1)
- [14]. Viiri, J. & Saari, H. (2006) Teacher talk patterns in science lessons: Use in Teacher Education, *Journal of Science Teacher Education*, Vol.17: 347 — 365.
- [15]. West African Examinations Council (WAEC) (2002) Chief Examiner's Report on Biology.
- [16]. West African Examinations Council (WAEC) (2004) Chief Examiners' Report on Biology